MODERN GREEN HOMES

Sanctuary

ISSUE 64

Prefab & modular supplier guide; reclaimed timber treasure trove; joey sanctuary bushfire rebuild; sweet syrups from foraged flora

PREFAB POWER

OFFSITE CONSTRUCTION GATHERS PACE

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WIN

One of two e-scooters from Voltrium, with a total prize value of $6,500

Offer open to Australian residents. Details page 81

Prefab perfection

LOCATION Richmond, VIC • **WORDS** Kellie Flanagan • **PHOTOGRAPHY** Aaron Pocock Photography

At a glance

- Prefabricated, panelised extension designed to Passive House Low Energy Building standard
- Quiet, cosy and calm oasis for family living in a noisy neighbourhood
- All-electric with solar PV and induction cooking

Squeezed onto a tight inner-Melbourne site, a high-performing prefabricated extension gives a Victorian cottage a new life.

When David and Sally Ritter wanted to buy into the busy inner-urban Melbourne suburb of Richmond, real estate pickings were slim for a family without a huge budget. They eventually found a tiny semi-detached Victorian cottage on a very small site near a busy main road. It was "cramped, damp and dark," says Sally, with a lean-to kitchen and bathroom and a small yard backing onto a laneway. But it had great heritage value, and the double-brick construction of the front section was solid and worth saving.

The family embarked on a project to improve the home with a modern extension. Their brief included an open-plan living space adaptable to a variety of uses, "connectivity to sky" and views, better access to daylight, and a place that would be a quiet haven in their bustling inner-city neighbourhood. Finally, design and construction of the extension to meet the Passive House standard was a must-have for David, a certified Passive House consultant and director at sustainable design consultancy Atelier Ten.

The concept design was devised by noted architect Kerstin Thompson, who was inspired by the couple's plans for a Passive House extension to a Victorian cottage – a challenging mission. "She's very generous," David says. "It was a very nice experience working with a great architect to identify a strong design concept."

Kerstin's design integrates a steel-clad, angular double-storey extension into the small site, respecting the built forms and character of the heritage neighbourhood while adding light and spacious new living areas. At ground level, a kitchen and dining area with a kitchen along one side takes up almost all of the footprint; a bathroom, separate toilet and laundry are tucked away at the far end. Upstairs, a mezzanine houses a bedroom with ensuite. A courtyard garden (designed

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The extension is a comfortable, quiet oasis in a busy inner-city neighbourhood.

“Taking a great concept design to delivery by a prefabrication company can be a really good way to go for a high-performance home.”

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An all-electric kitchen occupies the southern wall of the very compact extension. Double-glazed skylights help ensure that the interior is flooded with daylight.

by Sally, a landscape architect) separates the addition from the retained part of the original cottage, and a breezeway provides access between them.

To bring the concept to life, David looked to prefabrication. "I had an idea that going down the prefab route would be a good option for this build, given that we were looking to achieve Passive House performance," he says. The promise of a faster build on site also appealed, because it would minimise the time that the family would have to be out of their home.

The project was taken on and the design concept finessed by ARKit, a Melbourne-based prefabricated building design and construct firm. "Our panelised prefabricated solution saw the majority of the external walls, upper floor and roof structure built in our factory, then transported to site," explains ARKit director Craig Chatman. The pre-built panels included the various layers required for Passive House construction: an internal air barrier, insulation, a battened space for services, and an external moisture barrier.

"I would argue that offsite construction and Passive House are a perfect match," says Craig. "By building these components in the controlled environment of our factory, we're able to accurately record the construction process of each one via our quality assurance system, which helps with Passive House certification."

The tight site presented challenges for transport and construction, and as has been the case with many projects recently, Covid created some delays, but the worst impacts were avoided thanks to the offsite fabrication and the fact that the team at ARKit had been able to pre-order and store materials ahead of projected supply chain shortages and price rises.

The construction of the extension on site took just 10 days, with another four months for the finishing touches (excluding delays caused by Covid). It incorporates the five key elements of Passive House: continuous insulation, minimal thermal bridges, high-performance glazing, filtered fresh air via a mechanical ventilation system with heat recovery, and a very high level of airtightness. Due to the challenging location and overshadowing, and as the new structure adjoins a building that has not yet been brought up to standard, the addition doesn't quite satisfy the stringent requirements for 'classic' Passive House certification, but it does meet the slightly more forgiving Passive House Low Energy Building standard, and the process is underway to seek certification.

The extension achieved an airtightness of 0.52 air changes per hour at 50 pascals (ACH50). In practical terms, this means a comfortable, quiet oasis in Sally and David's busy neighbourhood. "We can hardly hear any noise coming in from outside," says David. The thermal comfort is also exceptional, with minimal need for active heating and cooling.

Some renovations have also been made to the original cottage, including heritage-sensitive upgrades to the windows using acoustic glazing, and further improvements to insulation and ventilation are planned soon. "We'll take a Passive House-type approach to the cottage as well," David says.

The family is enjoying their updated home immensely. "It's incredibly comfortable to live in," says Sally. "It's light, it's bright, and it cuts out all the noise from the street. It's such a pleasant space to be in."

"We're totally happy with it," agrees David. "Taking a great concept design to delivery by a 'design and construct' prefabrication company can be a really good way to go for a high-performance home."

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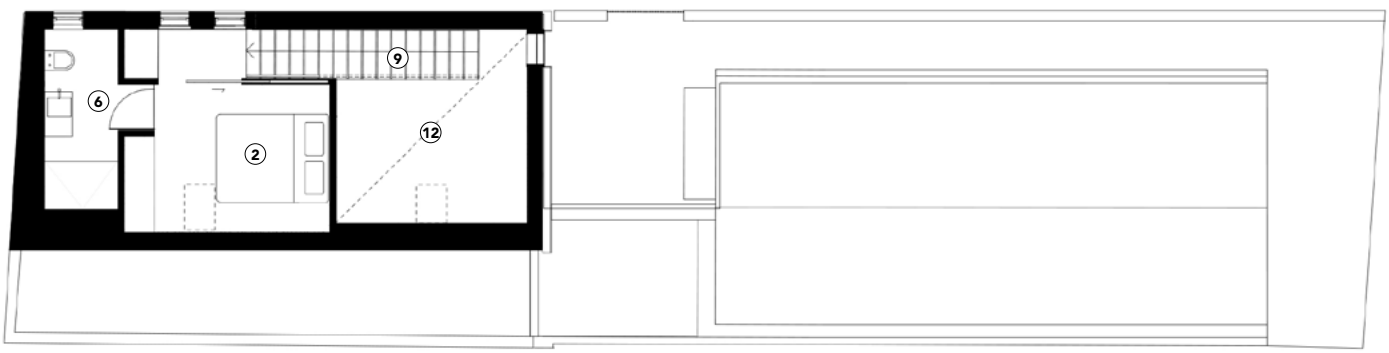
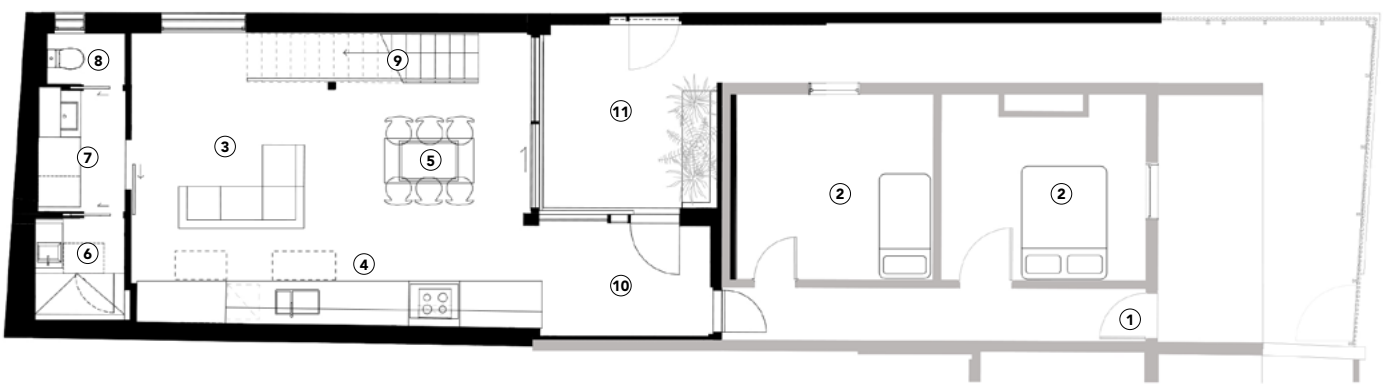
While the site doesn't offer impressive views, homeowner David loves the long outlook down the staircase, through the tall eastern window and down the alleyway. "You get these little vignettes that give connection," he says. "And you can look up and see the stars through the skylights." The courtyard – designed by homeowner Sally – offers a private outdoor space filled with green.

MEZZANINE FLOOR PLAN



GROUND FLOOR PLAN



LEGEND

1 Entry
2 Bedroom
3 Living
4 Kitchen
5 Dining
6 Bathroom
7 Laundry
8 Toilet
9 Stairs
10 Breezeway
11 Courtyard
12 Void

HOUSE SPECIFICATIONS

HOT WATER
- Stiebel Eltron instantaneous electric hot water systems in kitchen and laundry (supplying bathrooms)

RENEWABLE ENERGY
- 3.52kW solar PV system
- Wiring in place for future installation of Tesla Powerwall battery storage

WATER SAVING
- Caroma Profile 5 integrated toilet suite and hand basin (WELS 5 star)
- Raingarden integrated into courtyard to treat roof runoff prior to discharge

PASSIVE DESIGN, HEATING & COOLING
- Extension designed for optimum form and orientation to achieve a high-performance, airtight and energy-efficient dwelling meeting Passive House Low Energy Building requirements, including airtightness of 0.52ACH50 (air changes per hour at 50 pascals)
- Stack ventilation with fan assist for summer heat purging

ACTIVE HEATING, COOLING & VENTILATION
- Zehnder mechanical ventilation system with heat recovery (MVHR)
- Daikin 2.5kW bulkhead-concealed reverse-cycle air conditioner

BUILDING MATERIALS
- Prefabricated timber-framed panelised structural solution with minimal structural steel
- Fielders corrugated steel cladding and roofing
- James Hardie fibre cement sheet cladding
- Greenstar mix concrete slab floor: 40% Portland cement reduction with 25% fine aggregate replacement
- Concrete blockwork boundary wall
- Victorian ash flooring (FSC-certified) to mezzanine and stairs
- Insulation: Knauf Earthwool batts and Pink Batts to roof (R5.1 total), Bradford Gold HP batts to upper walls (R5.5), Bradford Gold HP batts and Pink Batts to masonry veneer lower walls (R5.1 total), Knauf ClimaFoam 100mm under slab (R3.6)
- Kitchen: Laminex cabinetry in Bayleaf; stainless steel benchtop
- Blackbutt batten fence and decking (FSC-certified)

WINDOWS & GLAZING
- Logikhaus thermally-broken aluminium-framed double-glazed windows and doors
- Velux double-glazed skylights

LIGHTING
- Ecosmart Lighting Ecogem LED downlights
- Feature pendant LED lights

COOKING
- Falcon 90cm Professional freestanding electric oven with induction cooktop
- Bosch integrated rangehood

PAINTS, FINISHES & FLOOR COVERINGS
- Dulux Low Sheen low-VOC interior paints
- Bona Traffic HD finish to Victorian ash flooring and stairs
- Outback Spirit wool carpet to mezzanine bedroom

OTHER ESD FEATURES
- The extension was built using ARKit's panelised building system, with prefabricated sections constructed in ARKit's workshop and delivered to site, offering greater speed and efficiency over conventional construction with minimal waste

DESIGNERS
Kerstin Thompson Architects (concept design) & ARKit

BUILDER
ARKit

PROJECT TYPE
Extension

LOCATION
Richmond, VIC (Wurundjeri Country)

TOTAL PROJECT COST
$835,000

SIZE
House 132m^2 total (extension ground floor 64m^2, mezzanine 22m^2)
Land 145m^2

ENERGY RATING
Passive House Low Energy Building certification pending for extension

ENERGY ASSESSOR
Atelier Ten

PASSIVE HOUSE CERTIFIER
Detail Green

INSIGHTS
"The solar PV system is producing about 78 per cent of the energy the household consumes, which is actually a terrific outcome on this site where we haven't got a lot of sun."

David Ritter, homeowner